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ABSTRACT OF THE DISCLOSURE

The high-side transistor driver according to the present invention includes a high-side transistor, a low-side transistor, a drive-buffer and an on/off transistor. When the low-side transistor is turned on, a charge-pump diode and a bootstrap capacitor produce a floating voltage. The drive-buffer will propagate the floating voltage to switch on the high-side transistor. The on/off transistor is used to switch the drive-buffer. The high-side transistor driver further includes a speed-up circuit. The speed-up circuit has a capacitive coupling for generating a differential signal. When the on/off transistor is turned off, the speed-up circuit accelerates the charge-up of the parasitic capacitor of the on/off transistor, thus accelerating high-side transistor switching.